WHAT IS CLAIMED IS:

1. An inkjet printing apparatus for performing printing on a printing medium by using a printing head for ejecting ink, comprising:

a first ink tank serving as a source of the ink;

a second ink tank which can be charged with ink from said first ink tank, which supplies the ink to said printing head during printing, and which is formed with a variable internal volume; and

internal volume changing means for applying a force to said second ink tank such that the internal volume is increased to charge said second ink tank with the ink from said first ink tank and such that the internal volume is reduced to return the contents of said second ink tank to said first ink tank.

2. A printing apparatus as claimed in claim 1, wherein a channel for supplying ink from said first ink tank to said second ink tank is used for returning the contents to said first ink tank.

3. A printing apparatus as claimed in claim 1, wherein said second ink tank has a structure which expands and contracts to increase and reduce the internal volume and wherein, said internal volume changing means has a shell element for containing said second ink tank, said apparatus further comprising pressurizing and depressurizing means for depressurizing and pressuring the interior of said shell element to expand and contract said second ink tank.

4. A printing apparatus as claimed in claim 2, wherein said shell element contains said second ink tank in a quantity corresponding to the types of inks to be used.

5. A printing apparatus as claimed in claim 3, wherein said pressurizing and depressurizing means depressurizes or pressurizes the interior of said shell element using a gas or a liquid as a medium.

6. A printing apparatus as claimed in claim 1, further comprising channel opening and closing means for forming and blocking said channel connecting said first ink tank and said second ink tank, wherein said channel opening and closing means forms said channel when a process of charging said second ink tank with ink is performed and when a process of returning the contents of said second ink tank to said first ink tank is performed.

7. A printing apparatus as claimed in claim 6, wherein said channel opening and closing means has a pair of valve units which can be coupled with and decoupled from each other and which form said channel in a coupled state and close said channel in a decoupled state.

8. A printing apparatus as claimed in claim 7, further comprising a scanning member for supporting said printing head and said second ink tank and scanning them in a predetermined direction relative to said printing medium, wherein said pair of valve units are coupled when said scanning member is set in a predetermined position in the scanning direction.

9. A printing apparatus as claimed in claim 6, wherein said channel opening and closing means has a valve unit which is disposed in said channel connecting said first ink tank and second ink tank and which is controlled such that it opens and closes said channel.

10. A printing apparatus as claimed in claim 9, further comprising a scanning member for supporting said printing head and said second ink tank and scanning them in a predetermined direction relative to said printing medium, wherein said channel extending from said valve unit to said second ink tank is constituted by a flexible tube member.

11. A printing apparatus as claimed in claim 1, further comprising control means for causing the process of returning the contents of said second ink tank to said first ink tank prior to the charging process for charging said second ink tank with ink according to a predetermined judgment.

12. A printing apparatus as claimed in claim 11, wherein said control means judges whether to perform the returning process prior to the charging process according to the elapsed time or the number of charging processes since the time when the last returning process was performed or a combination of such factors.

13. A printing apparatus as claimed in claim 12, wherein said control means changes the time of the returning process according to the condition for the judgment.

14. A printing apparatus as claimed in claim 11, wherein said control means sets or variably sets the condition for the judgment according to at least any one of conditions of the ambient temperature, humidity, and the types of the ink and said printing head.

15. A printing apparatus as claimed in claim 1, wherein a maximum capacity of said second ink tank or a maximum discharge capacity of the same as a

result of a reduction of the internal volume is greater than the capacity of said channel connecting said first ink tank and said second ink tank.

16. A printing apparatus as claimed in claim 15, wherein the maximum capacity or the maximum discharge capacity of said second ink tank is greater than twice the capacity of said channel connecting said first ink tank and said second ink tank.

17. A printing apparatus as claimed in claim 1, wherein said second ink tank is directly connected to said printing head.

18. A printing apparatus as claimed in claim 17, further comprising discharge control means for discharging a predetermined amount of ink from said second ink tank after said second ink tank is charged with ink, thereby generating a negative pressure in said second ink tank that is in equilibrium with an ability to hold meniscuses formed at an ink ejecting portions of said printing head.

19. A printing apparatus as claimed in claim 18, wherein said discharge control means performs control such that the internal volume of said second ink tank is reduced by a predetermined amount to return the ink to said first ink tank.

20. A printing apparatus as claimed in claim 18, wherein said discharge control means performs control such that ink is ejected from said printing head.

21. A printing apparatus as claimed in claim 18, wherein a negative pressure generating member is provided in said second ink tank to generate said negative pressure, said negative pressure being within a range in which an ejecting operation of said printing head can be performed .

22. A printing apparatus as claimed in claim 21, wherein said negative pressure generating member generates a negative pressure that is within a range in which an ejecting operation of said printing head can be performed in equilibrium with the ability to hold meniscuses formed at an ink ejecting portions of said printing head until the internal volume of said second ink tank is minimized.

23. A printing apparatus as claimed in claim 2, wherein said shell element contains a plurality of said second ink tanks charged with different amounts of ink.

24. A printing apparatus as claimed in claim 23, wherein a charging time is set to accommodate at least one of the plurality of said second ink tanks that requires the longest time to charge.

25. A printing apparatus as claimed in claim 23, wherein a charging time is variably set to accommodate at least one of the plurality of said second ink tanks that requires the longest time to charge.

26. A printing apparatus as claimed in claim 25, wherein the time required for charging is calculated from the amount of ink used.

27. A printing apparatus as claimed in claim 1, wherein said second ink tank is directly connected to said printing head and wherein the internal volume changing means applies a force that is equal to or smaller than the capacity of said printing head to bear meniscuses formed at said ink ejecting section.

28. An ink supplying method used for an inkjet printing apparatus for performing printing on a printing medium by using a printing head for ejecting ink, said method comprising the steps of:

providing a first ink tank serving as a source of the ink;

providing a second ink tank which can be charged with ink from said first ink tank, which supplies the ink to said printing head during printing, and which is formed with a variable internal volume;

charging said second ink tank with the ink from said first ink tank by increasing the internal volume of said second ink tank; and

returning the contents of said second ink tank to said first ink tank by reducing the internal volume of said second ink tank.

29. An ink supplying method as claimed in claim 28, wherein said second ink tank has a structure which expands and contracts to increase and reduce the internal volume and is contained in a shell element, and wherein said second ink tank expands and contracts by depressurizing and pressuring the interior of said shell element.

30. An ink supplying method as claimed in claim 28, further comprising control step of causing the process of returning the contents of said second ink tank to said first ink tank prior to said charging step according to a predetermined judgment.

31. An ink container that can be disposed halfway of an ink supply path connecting a printing head for performing printing by ejecting ink and an ink tank serving as a supply source of ink to be supplied to said printing head, comprising:

an ink containing body capable of containing ink introduced thereto from said ink tank in a state in which it is in fluid communication with said ink tank,

said ink containing body supplying the ink contained therein to said printing head during printing and having a part that can be displaced in the direction of increasing an internal volume thereof to introduce the ink;

a housing having an inner space in which a pressure can be adjusted, said housing allowing said ink containing body to be contained in the space and allowing an increase in the internal volume thereof in accordance with the pressure adjustment; and

regulating means provided in said housing such that it can regulate the displacement of the part of said ink containing body in the direction of increasing the internal volume to a predetermined position.

32. An ink container as claimed in claim 31, wherein said ink containing body is provided with urging means for urging said ink containing body in the direction of increasing the internal volume thereof to generate a negative pressure in equilibrium with an ability to hold meniscuses formed at an ink ejecting portions of said printing head.

33. An ink container as claimed in claim 32, wherein the regulation performed by said regulating means is canceled to allow urging of said urging means, thereby putting said ink containing body under the negative pressure in equilibrium with the ability to hold meniscuses.

34. An ink container as claimed in claim 31, wherein the regulation performed by said regulating means is canceled to allow said ink containing body to expand, thereby allowing air present in said ink containing body to expand.

35. An ink container as claimed in claim 31, wherein said ink containing body has a flexible structure which expands when the inner space of said housing is depressurized to increase said internal volume.

36. An ink container as claimed in claim 35, wherein said ink containing body has a member having an end attached to an inner wall of said housing and another end that can be displaced according to the expansion; said member can be put in fluid communication with said ink tank through a channel extending through said wall of said housing and the end; and an abutting section whose displacement is regulated by said regulating means is provided at the other end of said member.

37. An ink container as claimed in claim 36, wherein said urging means has a spring for urging the other end of said member in the direction of expanding of said member.

38. An ink container as claimed in claim 31, wherein the pressure in the inner space of said housing is adjusted using a gas or a liquid as a medium.

39. An ink container as claimed in claim 31, having a configuration in which it is directly connected to said printing head.

40. An ink container as claimed in claim 31, wherein said housing contains said ink containing body in a quantity corresponding to the types of inks to be used and wherein said regulating means is commonly used by said ink containing bodies.

41. An ink container as claimed in claim 31, wherein said regulating means has a regulating member which can expand according to depressurization of the

inner space of said housing and which abuts on the part of said ink containing body as a result of the expansion to regulate the displacement of the same.

42. An ink container as claimed in claim 41, wherein said regulating member has a member having an end attached to an inner wall of said housing and another end that can be displaced according to the expansion; said member is in communication with the atmosphere through an atmosphere communication section extending through said wall of said housing and the end; and an abutting section that abuts on the part is provided at the other end.

43. An ink container as claimed in claim 31, wherein said regulating means has a regulating member that can be displaced to a position in which it abuts on the part of said ink containing body to regulate the displacement of the same.

44. An ink container as claimed in claim 43, wherein said regulating member has a rod which can protrude towards the regulating position in accordance with an external signal.

45. An ink container as claimed in claim 43, wherein said regulating member has a member which can expand in response to introduction of pressurized air and which is displaced toward the regulating position as a result of the expansion.

46. An ink container as claimed in claim 43, wherein said regulating member has a member which can be rotated towards the regulating position in response to the application of an external force.

47. An inkjet printing apparatus for performing printing by using a printing head for ejecting ink, an ink tank serving as a source of ink to be supplied to

said printing head, and an ink container provided halfway of an ink supply path connecting said printing head and said ink tank as claimed in claim 41, said apparatus comprising:

channel opening and closing means for establishing and blocking fluid communication between said ink tank and said ink containing body; and

pressure adjusting means for reducing the pressure in the inner space of said housing in the communicated state to increase the internal volume of said ink containing body and to expand said regulating member and for canceling the depressurized state after the regulation is performed.

48. An inkjet printing apparatus as claimed in claim 47, wherein said channel opening and closing means blocks said channel when said pressure adjusting means cancels the depressurization.

49. An inkjet printing apparatus as claimed in claim 47, wherein said printing head and said ink container are integrally formed.

50. A printing apparatus as claimed in claim 47, wherein said printing head has a heating element for generating thermal energy that causes film boiling of ink as energy used to eject the ink.

51. An inkjet printing apparatus for performing printing by using a printing head for ejecting ink, an ink tank serving as a source of ink to be supplied to said printing head, and an ink container provided halfway of an ink supply path connecting said printing head and said ink tank as claimed in claim 43, said apparatus comprising:

channel opening and closing means for establishing and blocking fluid communication between said ink tank and said ink containing body;

pressure adjusting means for reducing the pressure in the inner space of said housing in the communicated state to increase the internal volume of said ink containing body; and

control means for displacing said regulating member towards the regulating position and for displacing said regulating member from the regulating position after the regulation is performed.

52. An inkjet printing apparatus as claimed in claim 51, wherein said control means displaces said regulating member towards the regulating position when the fluid communication is established by said channel opening and closing means, and displaces said regulating member from the regulating position when the reducing operation of the pressure is canceled by said pressure adjusting means, and wherein said channel opening and closing means blocks said channel when the reducing operation of the pressure is canceled by said pressure adjusting means.

53. An inkjet printing apparatus as claimed in claim 51, wherein said printing head and said ink container are integrally formed.

54. A printing apparatus as claimed in claim 51, wherein said printing head has a heating element for generating thermal energy that causes film boiling of ink as energy used to eject the ink.

55. An ink supplying method used for an inkjet printing apparatus for performing printing by using a printing head for ejecting ink, an ink tank serving as a source of ink to be supplied to said printing head, and an ink container provided halfway of an ink supply path connecting said printing head and said ink tank as claimed in claim 41, said method for supplying the ink to said ink container from said ink tank, said method comprising the steps of:

establishing fluid communication between said ink tank and said ink containing body;

reducing the pressure in the inner space of said housing in the communicated state to increase the internal volume of said ink containing body and to expand said regulating member; and

canceling the depressurized state after the regulation is performed.

56. An ink supplying method as claimed in claim 55, further comprising the step of blocking said channel when said pressure adjusting means cancels the depressurization.

57. An ink supplying method used for an inkjet printing apparatus for performing printing by using a printing head for ejecting ink, an ink tank serving as a source of ink to be supplied to said printing head, and an ink container provided halfway of an ink supply path connecting said printing head and said ink tank as claimed in claim 43, said method for supplying the ink to said ink container from said ink tank, said method comprising the steps of:

establishing fluid communication between said ink tank and said ink containing body;

reducing the pressure in the inner space of said housing in the communicated state to increase the internal volume of said ink containing body; and

controlling to displace said regulating member towards the regulating position and to displace said regulating member from the regulating position after the regulation is performed.

58. An ink supplying method as claimed in claim 57, wherein said controlling step has a step of displacing said regulating member towards the regulating position when the fluid communication is established and a step of displacing said

regulating member from the regulating position when the reducing operation of the pressure is canceled, and said method further comprising a step of blocking said channel when the reducing operation of the pressure is canceled.

59. An ink supplying method for supplying ink to an ink container accommodating an ink containing body capable of containing the ink therein and capable of generating a negative pressure by an elastic force from an ink tank serving the ink to be supplied to a printing head, said method comprising the steps of:

establishing fluid communication between said ink tank and said ink containing body;

depressurizing the interior of said ink container to expand said ink containing body, thereby introducing the ink to said ink containing body from said ink tank; and

regulating the expansion of said ink containing body by using displaceable regulating means, thereby stopping the introduction of the ink.

60. An ink supplying method for supplying ink to an ink container accommodating an ink containing body capable of containing the ink therein and capable of changing an internal volume thereof with a flexible structure from an ink tank serving the ink to be supplied to a printing head, said method comprising the steps of:

establishing fluid communication between said ink tank and said ink containing body;

increasing the internal volume of said ink containing body, thereby introducing the ink to said ink containing body from said ink tank; and

regulating the increase of the internal volume of said ink containing body by using displaceable regulating means, thereby stopping the introduction of the ink.

61. An ink supplying method as claimed in claim 60, further comprising a step of canceling the regulation by said regulating means to put said ink containing body under a negative pressure in equilibrium with an ability to hold meniscuses formed at an ink ejecting portions of said printing head.

62. An ink container that can be disposed halfway of an ink supply path connecting a printing head for performing printing by ejecting ink and an ink tank serving as a source of ink to be supplied to said printing head, comprising:

an ink containing body capable of containing ink introduced thereto from said ink tank in a state in which it is in fluid communication with said ink tank, said ink containing body supplying the ink contained therein to said printing head during printing and having a flexible structure whose internal volume can be increased as a result of expansion to introduce ink therein and which can generate a negative pressure;

a housing having an inner space in which a pressure can be adjusted, said housing allowing said ink containing body to be contained in the space and allowing the expansion thereof in accordance with depressurization; and

regulating means provided in said housing such that it can regulate the expansion of said ink containing body,

wherein said regulating means is configured to regulate the expansion so as to satisfy an equation:

$$Pst = Nt$$

where Pst represents the negative pressure generated by said ink containing body and Nt represents an ability to hold meniscuses formed at an ink ejecting portions of said printing head.

63. An ink container as claimed in claim 62, wherein the regulation performed by said regulating means is cancelled to allow said ink containing body to expand and generate the negative pressure, thereby satisfying said equation.

64. An ink container as claimed in claim 63, wherein said ink containing body has a member having an end attached to an inner wall of said housing and another end that can be displaced according to the expansion; said member can be put in fluid communication with said ink tank through channel extending through said wall of said housing and the end; and an abutting section whose displacement is regulated by said regulating means is provided at the other end.

65. An ink container as claimed in claim 64, wherein said ink containing body is provided with a spring for generating the negative pressure by urging the other end of said member in the direction of expanding of said member.

66. An ink container as claimed in claim 65, wherein said regulating means has a regulating member which can expand to a predetermined position according to depressurization of the inner space of said housing and which abuts on said abutting section of said ink containing body as a result of the expansion to regulate the displacement of the same.

67. An ink container as claimed in claim 66, wherein said regulating member has a member having an end attached to an inner wall of said housing and another end that can be displaced according to the expansion; said member is in communication with the atmosphere through an atmosphere communication section extending through said wall of said housing and the end; and an abutting section that abuts on the part is provided at the other end.

68. An ink container as claimed in claim 67, wherein an equation

$$Ast < Alb$$

is satisfied where Ast and Alb represent pressure bearing areas of said abutting section of said ink containing body and said abutting section of said expansion regulating member, respectively.

69. An ink container as claimed in claim 68, wherein an equation

$$(Pp \times Ast) + Fst + (Pit \times Ast) < (Pp \times Alb) - Flb$$

is satisfied where Pp represents a pressure acting in said housing as a result of the depressurizing operation; Fst represents a force urging said ink containing body in the expanding direction; Flb represents a force acting in the direction of contracting said regulating member; and Pit represents a pressure acting on said ink containing body in accordance with the relationship between the heights of said ink containing body and said ink tank.

70. An ink container as claimed in claim 62, having a configuration in which it is directly connected to said printing head.

71. An inkjet printing apparatus for performing printing by using a printing head for ejecting ink, an ink tank serving as a source of ink to be supplied to said printing head, and an ink container provided halfway of an ink supply path connecting said printing head and said ink tank as claimed in claim 5, said apparatus comprising:

channel opening and closing means for establishing and blocking fluid communication between said ink tank and said ink containing body; and

pressure adjusting means for reducing the pressure in the inner space of said housing in the communicated state to increase the internal volume of said ink

containing body and to expand said regulating member and for canceling the depressurized state after the regulation is performed.

72. An inkjet printing apparatus as claimed in claim 71, wherein said channel opening and closing means blocks said channel when the pressure adjusting means cancels the depressurization.

73. An inkjet printing apparatus utilizing an ink tank capable of containing ink to be supplied to a printing head for performing printing by ejecting ink and an ink container containing an ink containing body which can contain ink therein and whose internal volume can be changed to generate a negative pressure, said apparatus comprising:

pressure adjusting means for reducing the pressure in said ink container in a state in which it is in fluid communication with said ink tank to expand said ink containing body, thereby introducing ink from said ink tank into said ink containing body; and

regulating means capable of regulating the expansion of said ink containing body,

wherein said regulating means regulates the expansion so as to satisfy an equation

$$Pst = Nt$$

where Pst represents the negative pressure generated by said ink containing body and Nt represents an ability to hold meniscuses formed at an ink ejecting portions of said printing head.

74. An inkjet printing apparatus as claimed in claim 73, wherein the regulation performed by said regulating means is cancelled to allow said ink

containing body to expand and generate the negative pressure, thereby satisfying said equation.

75. An inkjet printing apparatus utilizing an ink tank capable of containing ink to be supplied to a printing head for performing printing by ejecting ink and an ink container containing an ink containing body which can contain ink therein and which can generate a negative pressure, said apparatus comprising:

means for putting said ink tank and said ink containing body in fluid communication;

means for introducing ink from said ink tank into said ink containing body in the communicated state; and

means for stopping the introduction of ink by regulating the expansion of said ink containing body with regulating means that can be displaced and for substantially achieving equilibrium between an ability to hold meniscuses formed at an ink ejecting portions of said printing head and the negative pressure generated by said ink containing body.

76. An inkjet printing apparatus as claimed in claim 75, wherein the regulation performed by said regulating means is canceled to allow said ink containing body to expand and to generate the negative pressure, thereby satisfying conditions to substantially achieve the equilibrium.

77. An inkjet printing apparatus as claimed in claim 73, wherein said ink container is provided halfway of an ink supply path connecting said ink tank and said printing head.

78. An inkjet printing apparatus as claimed in claim 73, wherein said printing head and said ink container are integrally formed.

79. An inkjet printing apparatus as claimed in claim 73, wherein said printing head has a heating element for generating thermal energy that causes film boiling of ink as energy used to eject the ink.

80. An ink supplying method used for an inkjet printing apparatus for performing printing by using a printing head for ejecting ink, an ink tank serving as a source of ink to be supplied to said printing head, and an ink container provided halfway of an ink supply path connecting said printing head and said ink tank as claimed in claim 66, said method for supplying the ink to said ink container from said ink tank, said method comprising the steps of:

establishing fluid communication between said ink tank and said ink containing body;

reducing the pressure in the inner space of said housing in the communicated state to increase the internal volume of said ink containing body and to expand said regulating member; and

canceling the depressurized state after the regulation is performed.

81. An ink supplying method as claimed in claim 80, further comprising the step of blocking said channel when said pressure adjusting means cancels the depressurization.

82. An ink supplying method used for an inkjet printing apparatus utilizing an ink tank capable of containing ink to be supplied to a printing head for performing printing by ejecting ink and an ink container containing an ink containing body which can contain ink therein and whose internal volume can be changed to generate a negative pressure, said method for supplying the ink to said ink container from said ink tank, said method comprising the steps of:

reducing the pressure in said ink container in a state in which it is in fluid communication with said ink tank to expand said ink containing body, thereby introducing ink from said ink tank into said ink containing body; and

regulating the expansion of said ink containing body by using regulating means so as to satisfy an equation

$$Pst = Nt$$

where Pst represents the negative pressure generated by said ink containing body and Nt represents an ability to hold meniscuses formed at an ink ejecting portions of said printing head.

83. An ink supplying method as claimed in claim 82, wherein the regulation performed by said regulating means is cancelled to allow said ink containing body to expand and generate the negative pressure, thereby satisfying said equation.

84. An ink supplying method used for an inkjet printing apparatus utilizing an ink tank capable of containing ink to be supplied to a printing head for performing printing by ejecting ink and an ink container containing an ink containing body which can contain ink therein and which can generate a negative pressure, said method for supplying the ink to said ink container from said ink tank, said method comprising the steps of:

putting said ink tank and said ink containing body in fluid communication;

introducing ink from said ink tank into said ink containing body in the communicated state; and

stopping the introduction of ink by regulating the expansion of said ink containing body with regulating means that can be displaced and for substantially achieving equilibrium between an ability to hold meniscuses formed at an ink ejecting

portions of said printing head and the negative pressure generated by said ink containing body.

85. An ink supplying method as claimed in claim 84, wherein the regulation performed by said regulating means is canceled to allow said ink containing body to expand and to generate the negative pressure, thereby satisfying conditions to substantially achieve the equilibrium.